On the Proper Motion of the star B.A.C. 793.

By W. T. Lynn, B.A.

In the number of the *Monthly Notices* for May 1875 (vol. xxxv. p. 356) Professor Piazzi Smyth contributed a paper on the proper motion of the star *B.A.C.* 793 (=Piazzi II. 123), suggesting that this was variable in amount, and had sensibly diminished in R.A. and increased in N.P.D. Mr. Dunkin, however, showed from a discussion of the Greenwich observations that there was no real evidence of change of this kind in either element. He followed this up in the number for March 1876 (vol. xxxvi. p. 254), deducing the proper motion of the star from more recent Greenwich observations, which he determined to be $+0^{s}\cdot119$ in R.A. and $-1''\cdot50$ in N.P.D., and remarking that "the proper motion of *B.A.C.* 793 has not really changed during the present century." Mr. Stone also communicated a short paper after Mr. Dunkin's, pointing out that the Cape observations of the star in R.A. (none were available in N.P.D.) did not give any evidence of change in proper motion. The value used in the 9-year Catalogue (slightly modified in the 10-year) is the one determined by Mr. Dunkin, that in N.P.D. being about $0''\cdot2$ larger than the value given in the *B.A.C.*, which is $-1''\cdot31$, and had been adopted in previous Greenwich catalogues.

In a letter of mine which appeared in the number of the *Observatory* for last August, I showed, by comparing the places in the Greenwich 9-year and 10-year Catalogues, that there is some doubt whether after all the *B.A.C.* value of the proper motion in N.P.D. is not nearer the truth.

I will here set down the places derived from all the principal Greenwich catalogues, five of which contain observations of this star. They are as follows :

In R.A.

Catalogue.	Epoch.	h m s	No. of Obs.
12-year (first part)	1840	2 27 18·75	5
6-year (corrected)	1850	2 27 51·81	1
7-year	1860	2 28 24·47	29
9-year	1872	2 29 3·818	13
10-year	1880	2 29 30·084	13

The differences of these give for

	s		s
10 years	+33·06	annually	+3·306
10 years	+32·66	,,	+3·266
12 years	+39·348	,,	+3·279
8 years	+26·266	,,	+3·283

Now the mean annual precessions during these intervals are $+3^s\cdot158$, $+3^s\cdot159$, $+3^s\cdot160$, and $+3^s\cdot161$ respectively, deducting which, we find the resulting proper motion from each comparison $+0^s\cdot148$, $+0^s\cdot107$, $+0^s\cdot119$, and $+0^s\cdot122$, the mean of which is $+0^s\cdot124$. Or taking the difference from the extreme interval, 1840 to 1880, this is $+2^m\ 11^s\cdot334$ for forty years, or $+3^s\cdot283$ annually; thence deducting the mean precession, $+3^s\cdot160$, we obtain $+0^s\cdot123$ for proper motion, which would therefore appear to be a very accurate value.

In like manner:

Catalogue.	Epoch.	*In N.P.D.* N.P.D.	No. of Obs.
12-year (second part)	1845	83 51 21·82	5
6-year (corrected)	1850	83 49 56·99	1
7-year	1860	83 47 1·88	30
9-year	1872	83 43 31·02	14
10-year	1880	83 41 15·12	12

The differences of these, with the resulting annual changes, are:

5 years	$-1'\ 24''\cdot83$	annually	$-16''\cdot96$
10 years	$-2\ 55\cdot11$	,,	$-17\cdot51$
12 years	$-3\ 30\cdot86$	,,	$-17\cdot57$
8 years	$-2\ 17\cdot90$	,,	$-17\cdot24$

The mean annual precessions during these intervals are $-16''\cdot02$, $-16''\cdot01$, $-15''\cdot98$, and $-15''\cdot95$ respectively, deducting which we find the resulting value of proper motion from each comparison $-0''\cdot94$, $-1''\cdot50$, $-1''\cdot59$, and $-1''\cdot29$ respectively, the mean of which is $-1''\cdot33$. Or, taking the difference from the extreme interval, 1845 to 1880, this amounts to $-10'\ 8''\cdot70$ for thirty-five years, or $-17''\cdot39$ annually; thence deducting the mean precession, $-15''\cdot99$, we obtain $-1''\cdot40$ for proper motion, of which, therefore, $-1''\cdot37$ would appear to be the most accurate value.

By the kind permission of the Astronomer Royal I am able to confirm and improve the above calculation by means of places derived from observations made at the Royal Observatory, Greenwich, in 1893 and 1894, but not yet published. These, reduced to the beginning of each year (none were made in 1891 or 1892), are as follows:

Year.	R.A. h m s	No. of Obs.	N.P.D.	No. of Obs.
1893	2 30 12·715	2	83 37 26·86	2
1894	2 30 16·028	5	83 37 9·35	5

Now a comparison of these places with those given in the 9-year Catalogue, the epoch of which is more than twenty years

anterior to their dates, leads to a proper motion of about $+0^s\cdot119$ in R.A. and $-1''\cdot43$ in N.P.D. It would seem, then, that the most probable value of the proper motion of this star is $+0^s\cdot121$ in R.A. and $-1''\cdot40$ in N.P.D. The latter value is about $0''\cdot1$ larger than that in the *B.A.C.*, and about $0''\cdot1$ smaller than that determined by Mr. Dunkin from earlier Greenwich observations. *Prima facie*, indeed, there is almost room for suspicion that the proper motion in N.P.D. is slowly increasing, though of course not in the way suggested by Professor Piazzi Smyth, which was founded on misconception.

Blackheath:
1895 *March* 4.

On the Proper Motion of the Star Cephei 24 (*Hev.*).

By W. T. Lynn, B.A.

In the Introduction to the eighth volume of the *Madras Observations*, which has been recently published, Mr. Michie Smith remarks that this star (which had been used for meridian error at Madras) had no proper motion assigned to it in the Greenwich 9-year Catalogue, but that there is little doubt that it has one considerable in amount. It is of the fifth magnitude, and is numbered 3402 in Groombridge's Catalogue, and Carrington considered that it had an appreciable proper motion. Mr. Stone follows the B.A.C. (where it is No. 7184) in locating it in *Ursa Minor*.

I have made an approximate determination of the proper motion, and herewith offer it to the Society, remarking that it can only be considered provisional, as the fractional proper motions have not been applied in the Catalogues, but it may form a basis for doing so in future. The star is included in both the Greenwich 7-year Catalogues, in the Greenwich 9-year, and in the last Radcliffe Catalogue for 1890. The places in each of these are as follows :—

Gr. 7-year Cat. 1860 ; R.A. $20^h\ 31^m\ 5^s\cdot49$ (5 obs.), precession $-43^s\cdot554$, sec. var. $-23^s\cdot6447$.

N.P.D. $1°\ 17'\ 57''\cdot68$ (8 obs.), precession $-12''\cdot27$, sec. var. $+5''\cdot029$.

Gr. 7-year Cat. 1864 ; R.A. $20^h\ 28^m\ 10^s\cdot22$ (2 obs.), precession $-44^s\cdot483$, sec. var. $-24^s\cdot0088$.

N.P.D. $1°\ 17'\ 7''\cdot94$ (4 obs.), precession $-12''08$, sec. var. $+5''\cdot184$.

Gr. 9-year Cat. 1872 ; R.A. $20^h\ 22^m\ 11^s\cdot693$ (4 obs.), precession $-46^s\cdot4169$, sec. var. $-24^s\cdot6431$.